SSPC: The Society for Protective Coatings

PAINT APPLICATION SPECIFICATION NO. 1

Shop, Field, and Maintenance Painting of Steel

1. Scope

1.1 This specification covers procedures for the painting of steel surfaces. The scope of this specification is rather broad, covering both specific as well as general requirements for the application of paint. This specification does not provide detailed descriptions of surface preparation, pretreatments, or selection of primers and finish coats. This specification does provide detailed coverage of the procedures and methods for application after the selection of the coating materials has been made.

2. Description

2.1 This specification for shop, field, and maintenance painting is intended to be used for steel which, because of its exposure condition, will be subjected to corrosive attack, either from the weather or from the service environment, and where a high quality of cleaning and painting is essential. It is not contemplated that the requirements of this specification are necessary for the cleaning and painting of steel which will not be subjected to corrosive attack. The following is a summary of the major sections of this specification.

3. Reference Standards

3.1 The standards referenced in this specification are listed in Sections 3.4 through 3.7 and form a part of this specification.

3.2 The latest issue, revision, or amendment of the referenced standards in effect on the date of invitation to bid shall govern unless otherwise specified.

3.3 If there is a conflict between the requirements of any of the cited reference standards and this specification, the requirements of this specification shall prevail.

3.4 SSPC: THE SOCIETY FOR PROTECTIVE COATINGS STANDARDS:

PA 2	Measurement of Dry Coating Thickness With Magnetic Gages
PA Guide 3	A Guide to Safety in Paint Application
SP 1	Solvent Cleaning

3.5 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARDS:

D 16	Terminology Relating to Paint, Varnish, Lacquer, and Related Products
D 4285	Method for Indicating Oil or Water in Compressed Air

3.7 NACE INTERNATIONAL STANDARD:

RP0178	Fabrication Details, Surface Finishing Requirements, and Proper Design Considerations for Tanks and Vessels to be Lined for Immersion Service

4. Definitions

4.1 SHOP, FIELD AND MAINTENANCE COATING: The application of coatings to steel surfaces whether in the shop or in the field.

4.2 PAINT: In the general sense, paint includes primers, enamels, varnishes, emulsions, catalyzed coatings, bituminous coatings, and other organic coatings. Inorganic coatings which are also applied as liquid films are included in this definition. This definition is compatible with most commonly used industry glossaries.

4.3 SHOP COATING: The surface preparation and coating of steel surfaces inside a shop or plant before shipment to the site of erection.

4.4 FIELD COATING: The on-site coating of new or previously coated steel structures before or after erection.

4.5 MAINTENANCE COATING: The coating of steel structures in service that have been previously coated and require touch-up or recoating.

4.6 MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS: These (or similar terms) are used to refer to an equipment supplier's or coating manufacturer's latest published or written instructions and recommendations. Verbal recommendations or instructions from an equipment or coating manufacturer are not acceptable unless backed up in writing by the manufacturer's technical staff.

5. Pre-Application Procedures

See Section 11 for procedures unique to specific generic coatings.

5.1 MATERIALS HANDLING AND USE

5.1.1 All coating shall be delivered to the shop or jobsite in original, unopened containers with labels intact. Minor damage to containers is acceptable provided the container has not been punctured or the lid seal broken.

5.1.2 Each container of coating shall be clearly marked or labelled to show coating identification, date of manufacture, batch number, and other information as needed to meet regulatory requirements. Each type of coating shall be accompanied by the manufacturer's Material Safety Data Sheet (MSDS) and product data sheet containing information such as basic chemical composition, weather conditions acceptable for application, and proper storing and mixing.

5.1.3 All containers of coating shall remain unopened until required for use. No more containers of coating shall be opened than will be applied that day. The label information shall be legible and shall be checked at the time of use.

5.1.4 Coating which has livered, gelled, or otherwise deteriorated during storage shall not be used; however, thixotropic materials which can be stirred to attain normal consistency may be used.

5.1.5 The oldest coating of each kind that is in acceptable condition shall be used first. In every case, coating is to be used before its shelf life has expired. Before using a coating which has exceeded its shelf life, the manufacturer shall verify its quality and then certify its use for a given period of time.

5.1.6 Coatings shall be stored in original unopened containers in weathertight spaces where the temperature is maintained between 40 °F and 100 °F (4 °C and 38 °C) unless otherwise recommended in writing by the manufacturer. The coating temperature shall be brought to the manufacturer's written recommended application temperature before use. (See Note 16.1 for more information on coating storage.)

5.2 SURFACE PREPARATION

5.2.1 The surface shall be cleaned as specified in the procurement documents. In no event shall the surface preparation be less than the paint manufacturer's recommendations for the intended service environment.

5.2.2 The surface to be coated shall have the specified surface preparation at the time of application of the coat-

ing. If the surface is degraded or contaminated subsequent to surface preparation and prior to coating, the surface shall be restored to the specified condition before coating application (see Note 16.2).

5.2.3 In order to control the degradation or contamination of cleaned surfaces, the pretreatments, or, in the absence of a pretreatment, the prime coat shall be applied as soon as possible after the surface has been cleaned and before degradation or contamination has occurred. Succeeding coats shall be applied before contamination of any existing coating occurs.

5.2.4 Previously applied coating shall be roughened prior to coating whenever necessary for the development of proper intercoat adhesion (see Section 6.11).

5.2.5 Cleaning and coating shall be scheduled to minimize the amount of dust and other contaminants that may fall on newly applied wet coating films. Surfaces not intended to be coated shall be suitably protected from the effects of cleaning and coating operations.

5.3 PRETREATMENTS

5.3.1 When specified, the surface shall be pretreated prior to application of the prime coat of coating.

5.3.2. The provisions of Sections 5.1 and 5.2 shall also apply to pretreated surfaces and the materials used for this purpose.

5.3.3 When chemical pretreatments are used, sufficient time shall elapse between pretreatment and application of the prime coat to permit any chemical action to be completed and the surface to dry. Two-component pretreatments shall be applied within the specified interval after mixing. When proprietary pretreatments are used, the instructions of the manufacturer shall be followed.

5.3.4 Inhibitive water washes used to prevent rusting of cleaned surfaces prior to coating shall not be considered pretreatments. These may be used only if they do not adversely affect the long term performance of the coating and are specifically authorized. Test patches may be used to check adhesion of the coating prior to coating the entire surface.

5.4 COATING MATERIALS PREPARATION

5.4.1 Single component coatings shall be thoroughly mixed to obtain a uniform composition. For multiple component coatings, each component shall be thoroughly mixed before combining and further mixing. In all cases, the manufacturer's written instructions for mixing shall be followed, and the products shall be checked for complete uniformity.

5.4.2 The following are acceptable methods for mixing most coatings:

5.4.2.1 Manual (Hand) Mixing: Most of the vehicle shall be poured off into a clean container. The pigment in the coating shall be lifted from the bottom of the container with a broad, flat paddle, lumps shall be broken up, and the pigment thoroughly mixed with the remaining vehicle. The poured off vehicle shall be returned to the coating with simultaneous stirring, or boxed until the composition is uniform. "Boxing" is the process of mixing coating by pouring from one container to another. The maximum container size for "boxing" shall be five gallons.

5.4.2.2 Power Mixing: This will usually give better mixing in a much shorter time than mixing by hand.

5.4.3 All pigmented coating shall be strained after mixing except where application equipment is provided with strainers. Strainers shall be of a size to remove only skins and undesirable matter but not to remove the pigment.

5.4.4 Where a skin has formed in the container, the skin shall be cut loose from the sides of the container, removed and discarded. If the volume of such skins is visually estimated to be more than 2% of the remaining coating, the coating shall not be used.

5.4.5 Mixing of solvent-containing coatings in open containers shall be done in a well ventilated area away from sparks or flames.

5.4.6 Coating shall not be mixed or kept in suspension by means of an air stream bubbling under the coating surface.

5.4.7 Dry pigments which are separately packaged shall be mixed into coatings in such a manner that they are uniformly blended and all particles of the dry powder are wetted by the vehicle.

5.4.8 Pastes shall be made into coatings in such a manner that the paste shall be uniformly blended and all lumps and particles broken up to form a homogenous coating.

5.4.9 Coating which does not have a limited pot life or does not deteriorate on standing may be mixed at any time before using, but if settling or phase separation has occurred it must be remixed immediately before using.

5.4.10 Coating shall not remain in spray pots, painters' buckets, etc., overnight, but shall be stored in a covered container and remixed before use.

5.4.11 Catalysts, curing agents, or hardeners which are separately packaged shall be added to the base coating only after the latter has been thoroughly mixed. The proper volume of the catalyst shall then be slowly poured into the required volume of base with constant agitation. Mixing of complete kits is preferred to avoid mixing incorrect ratios of components. Do not pour off the liquid which has separated from the pigment and then add the catalyst to the settled pigment to aid mixing. The mixture shall be used within the pot life specified by the manufacturer. For example, more

than 20 minutes and less than eight hours after mixing are the pot life limits for some chemically cured coatings (see Section 6.13). Therefore only enough coating should be catalyzed for prompt use. Most mixed, catalyzed coatings cannot be stored, and unused portions of these shall be placed in proper storage containers for later appropriate disposal. When specified, special continuous mixing equipment shall be used according to the manufacturer's directions.

5.4.12 Thinning of the coating shall be done only when necessary for proper application and when it will not result in violation of air pollution control regulations. Coatings to be applied by brush will usually require no thinning. Coatings to be sprayed, if not specifically formulated for spraying, may require thinning when proper adjustment of the spray equipment and air pressure does not result in satisfactory coating application. In no case shall more thinner be added than that recommended by the manufacturer's written instructions.

5.4.13 The type of thinner shall comply with the manufacturer's instructions.

5.4.14 When the use of thinner is permissible, thinner shall be added slowly to coating during the mixing process. All thinning shall be done under supervision of a knowledgeable person acquainted with the correct amount and type of thinner to be added to the coating and familiar with pertinent regulations relating to solvent emissions. Thinner should be at the same temperature as the coating material. At very low temperatures, thinners can shock sensitive coating materials, resulting in gelling.

6. Factors Affecting Application of Coatings

See Section 11 for factors unique to specific generic coatings.

6.1 TEMPERATURE: The application of a coating system shall occur only when the air and substrate temperature is within the range indicated by the manufacturer's written instructions for both application and curing and can be expected to remain in that range. Special coating materials are available that would allow for application below 60°F with or without further adjustment. (See Note 16.3.)

6.2 MOISTURE: Coating shall not be applied in rain, wind, snow, fog, or mist, or when the steel surface temperature is less than 5 °F (3 °C) above the dew point. Coating shall not be applied to wet or damp surfaces unless the coating is formulated and certified by the manufacturer for this type of application. Coating shall not be applied on frosted or ice-coated surfaces (see Note 16.4).

6.3 HUMIDITY: Because curing of coatings may be adversely affected by humidities that are too low or too high, no coating shall be applied unless the manufacturer's written requirements for humidity are met.

6.3.1 Some coatings (e.g., some inorganic zinc and polyurethane coatings) cure by chemically reacting with water, and so require a minimum humidity for complete curing.

6.3.2 High humidities may cause moisture to condense on or react with uncured coating films to cause blushing or other adverse effects.

6.4 COVER: When coating must be applied in damp or cold weather, the steel must be coated when the surrounding air and the steel are heated to a satisfactory temperature. In all such cases, the temperature and moisture conditions of Sections 6.1 and 6.2 must be met. Where cover is required to achieve these conditions, the steel shall remain under cover or be protected until dry or weather conditions permit its exposure.

6.5 DEFECTS: Defects in films that are not permitted by the contract specification shall be corrected in a manner satisfactory to the owner.

6.6 STRIPING: If stripe coating is specified in the procurement documents, all corners, crevices, rivets, bolts, welds, and sharp edges shall be stripe coated with the priming coating before the steel receives its first full prime coat of coating. Such striping shall extend a minimum of one inch (2 cm) from the edge. The stripe coat shall set to touch before the full prime coat is applied. However, the stripe coat shall not be permitted to dry for a period long enough to allow rusting of the unprimed steel. Alternatively, the stripe coat may be applied after a complete prime coat.

Stripe coating of edges, corners, rivets, welds, etc., is advantageous in preventing breakdown of coating on such edges in very corrosive surroundings. Striping is an expensive operation and may only be justified when it is believed the cost will be compensated for by extra life. To prevent removal of the stripe coat of coating by later application of the prime coat, the striped coating should be allowed to at least set to touch before application of the full prime coat; a longer drying period is advantageous, however. Where it is felt that a long drying period of stripe is necessary, but the precoated steel will deteriorate in the interval, the full prime coat of coating may be applied, allowed to dry, and the stripe coating then applied. Tinting of the striping coating is advisable to promote contrast (see Section 6.10). Stripe coating is most effective on edges that are rounded by grinding.

6.7 CONTINUITY: To the maximum extent practical, each coat shall be applied as a visually continuous film of uniform thickness free of pores. All thin spots or areas missed in the application shall be recoated and permitted to dry before the next coat of coating is applied.

6.8 THICKNESS: Unless otherwise specified in the procurement documents, all dry film thickness determinations shall be performed as specified in PA 2, Measurement of Dry Coating Thickness with Magnetic Gages. Coating thickness is usually specified (or implied) as a minimum. Greater thickness that does not detrimentally affect the

appearance or service life of the coating is permitted unless otherwise specified.

6.8.1 If not otherwise specified, each prime coat shall be within a thickness range of 1.5 mils (38 micrometers) to 2.5 mils (64 micrometers) when dry. Each intermediate and finish coat shall be within a thickness range of 1.0 mils (25 micrometers) to 2.0 mils (51 micrometers). As indicated in Section 11, vinyls, lacquers, emulsions, high-build coatings, and bituminous coatings usually deviate from these thicknesses.

6.8.2 In the event the required minimum thickness is not achieved as specified, additional coats shall be applied in accordance with the manufacturer's instructions until the required thickness is obtained. The inorganic zinc-rich coatings shall not be corrected in this manner unless the manufacturer's instructions specifically permit this practice.

6.9 RECOATING: Each coating layer shall be in a proper state of cure or dryness before the application of the succeeding coat so that it is not adversely affected by topcoating. Consult the coating manufacturer for the appropriate time interval before recoating.

6.10 TINTING: When successive coats of coating of the same color have been specified, alternate coats of coating shall be tinted, when practical, to produce enough contrast to indicate complete coverage of the surface. Tinting shall be performed in such a manner that it will not be necessary to tint the final coat. Field tinting shall be done only with coatings of the same type from the same manufacturer. When the coating is the color of the steel, the first coat to be applied shall be tinted. The tinting material shall be compatible with the coating and not detrimental to its service life. It is suggested that the coating be tinted by the manufacturer and appropriately labeled. Single component coatings to be blended for tinting shall be thoroughly mixed separately before combining and further mixing. For multiple-components, it is necessary to blend similar components of the two different colors together before combining and mixing these blends.

6.11 INTERCOAT ADHESION: When applying multiple coats of two component thermosetting systems, topcoats shall be applied within the recoat window specified by the manufacturer of the undercoat in order to obtain good intercoat adhesion. If, for any reason, this time period is exceeded, the undercoat surface shall be specially treated as recommended by its manufacturer before topcoating. Such treatments include mild abrasion, solvent treatment, and use of a fog coat.

6.12 CONTACT SURFACES: Unless otherwise required by the contract specification, the following practice shall be followed regarding coating of contact surfaces.

6.12.1 Steel to be embedded, encased or completely enclosed in brick or masonry shall be given at least one coat of coating that is compatible with masonry materials.

6.12.2 The areas to be in contact with wood shall receive the full specified coating system before assembly.

6.12.3 Surfaces to be in contact only after field erection shall receive the full-specified coating system before assembly.

6.12.4 Steel surfaces not in direct bonded contact, but inaccessible after assembly, shall receive the full-specified coating system before assembly.

6.12.5 Contact surfaces of members to be joined by high strength bonds in a friction connection are a special case. Unless specifically authorized to the contrary, they shall be left uncoated and free of oil, grease, and coatings. However, faying surfaces of friction connection may be coated with approved coatings which do not release the coefficient of friction between contact surfaces, in accordance with the American Institute of Steel Construction (AISC) and the Research Council on Structural Connections (RCSC).

6.13 INDUCTION TIME AND POT LIFE: The induction time (sometimes called "sweat-in time") and pot life requirements of the manufacturer shall be met.

7. Application Methods

See Section 11 for application methods unique to specific generic coatings.

7.1 GENERAL:

7.1.1 The following methods of application are covered by this specification: brush, roller, air spray, airless spray, plural component spray, hot spray, or any combination of these methods. Daubers or natural or synthetic wool mitts or other applicators may be used for places of difficult access when no other method is practical. Whichever application method is used, the dry film thickness of each coat shall meet the requirement of the specification or the manufacturer's recommendation, whichever has precedence, as agreed upon by owner and contractor. Also see Note 16.5.

7.1.2 The following methods of application are not covered by this specification: dipping, flow coating, electrostatic spray, and fluidized bed. If application by one of these methods is specified, it shall be done in accordance with the procurement documents or, if none are present, with the manufacturer's recommendations.

7.2 BRUSH APPLICATION: Brush application of coating shall be in accordance with the following:

7.2.1 Brushes shall be of a style and quality that will enable proper application of coating. Round or oval brushes are generally considered most suitable for rivets, bolts, irregular surfaces, and rough or pitted steel. Wide, flat brushes are suitable for large flat areas, but they should not have a width over five inches.

7.2.2 The brushing shall be done so that a smooth coat as uniform in thickness as possible is obtained.

7.2.3 Coating shall be worked into all crevices and corners.

7.2.4 All runs or sags shall be brushed out. (See 7.3.4.)

7.2.5 An attempt shall be made to minimize brush marks and other surface irregularities.

7.3 ROLLER APPLICATION: Roller application shall be in accordance with the following:

7.3.1 Rolling shall be done so that a smooth coat as uniform in thickness as possible is achieved.

7.3.2 Roller covers shall be selected which do not shed fibers into the paint. Their nap should be appropriate for the particular surface roughness.

7.3.3 Roller application may be used on flat or slightly curved surfaces and shall be in accordance with the recommendations of the coating manufacturer and roller manufacturer. Coating rollers shall be of a style and quality that will enable proper application of coating having the continuity and thickness required in Sections 6.7 and 6.8.

7.3.4 Roller application shall not be used on irregular surfaces such as rivets, bolts, crevices, welds, corners, or edges, unless otherwise specified. When permitted, however, the coating applied by roller on these irregular surfaces shall be subsequently brushed out to form a continuous and unbroken film (see Note 16.6).

7.4 SPRAY APPLICATION (GENERAL): All spray application of coating, whether air spray, airless spray, plural-component spray, hot air spray or hot airless spray, shall be in accordance with the following:

7.4.1 The equipment used shall be suitable for the intended purpose, shall be capable of properly atomizing the coating to be applied, and shall be equipped with suitable pressure regulators and gages. The equipment shall be maintained in proper working condition. Spray equipment shall meet the material transfer requirements of the local air pollution or air quality management district.

7.4.2 Coating ingredients shall be kept uniformly mixed in the spray pots or containers during coating application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

7.4.3 Spray equipment shall be kept sufficiently clean so that dirt, dried coating, and other foreign materials are not deposited in the coating film. Any solvents left in the equipment shall be completely removed before using.

7.4.4 Coating shall be applied in a uniform layer with overlapping at the edges of the spray pattern. During application, the gun shall be held perpendicular to the surface and at a distance which will ensure that a wet layer of coating is deposited on the surface. The trigger of the gun should be released at the end of each stroke.

7.4.5 All runs and sags shall be brushed out immediately, and if not, the coating shall be removed and the surface repainted. The wet film may be removed or allowed to dry and removed by sanding after curing.

7.4.6 Cracks, crevices, blind areas of all rivets and bolts, and all other inaccessible areas shall be coated by brush or daubers.

7.4.7 Particular care shall be observed with respect to type of thinner, amount of thinner, coating temperature, and operating techniques in order to avoid deposition of coating which is too viscous, too dry, or too thin. It may be necessary to use an approved different coating material or other equipment to resolve these problems.

7.4.8 Coatings formulated for application to hot surfaces may not be suitable for application to surfaces below the designed temperature. Conversely, coatings formulated for application at ambient or low temperatures may not be suitable for application to hot surfaces. Thus, coatings shall not be applied outside the manufacturer's recommended temperature range without the written approval of the manufacturer and the owner.

7.5 AIR ATOMIZING SPRAY APPLICATION: Compressed air atomizing spray application of coating shall be in accordance with all the provisions of Section 7.4 and in addition shall comply with the following:

7.5.1 The air caps, nozzles, and needles shall be those recommended by the manufacturers of the material being sprayed and the manufacturers of the equipment being used.

7.5.2 Traps or separators shall be provided to remove any oil or condensed water from the air. The traps or separators must be of adequate size and must be bled continuously or drained periodically during operations. The air from the spray gun impinging against a clean surface shall show no condensed water or oil. ASTM D 4285 provides a test procedure for indicating the presence of oil or water in compressed air.

7.5.3 The pressure on the material in the pot and of the air at the gun shall be adjusted for optimum spraying effectiveness. The pressure on the material in the pot shall be adjusted when necessary for changes in elevation of the gun with respect to the elevation of the pot. The atomizing air pressure at the gun shall be high enough to properly atomize the coating, but not so high as to cause excessive fogging of coating, excessive evaporation of solvent or loss by overspray.

7.6 AIRLESS SPRAY APPLICATION: Airless or high pressure spray application of coating shall be in accordance with all of the provisions of Section 7.4 and in addition shall comply with the following:

7.6.1 Fluid tips shall be of proper orifice size and fan angle, and the fluid control gun of proper construction, as recommended by the manufacturer of the material being

sprayed and the manufacturer of the equipment being used. Fluid tips shall be of the safety type with shields to prevent accidental penetration of the skin by the high pressure stream of coating.

7.6.2 The air pressure to the coating pump shall be adjusted so that the coating pressure to the gun is proper for optimum spraying effectiveness. This pressure shall be sufficiently high to properly atomize the coating. Pressures considerably higher than those necessary to properly atomize the coating should not be used.

7.6.3 Spraying equipment shall be kept clean and shall utilize proper filters in the high pressure line so that dirt, dry coating, and other foreign materials are not deposited in the coating film. Any solvents left in the equipment shall be completely removed before applying coating.

7.6.4 The trigger of the gun should be pulled fully open and held fully open during all spraying to ensure proper application of coating. During application, the gun shall be held perpendicular to the surface and at a distance which will ensure that a wet layer of coating is deposited on the surface. The trigger of the gun should be released at the end of each stroke.

7.6.5 Airless coating spray equipment shall always be provided with an electric ground wire in the high pressure line between the gun and the pumping equipment. Further, the pumping equipment shall be suitably grounded to avoid the build-up of any electrostatic charge on the gun. The manufacturer's instructions are to be followed regarding the proper use of the equipment. PA 3 provides information on how to use airless spray equipment safely.

7.7 AIR ASSISTED AIRLESS SPRAY: Air-assisted airless spray atomizes paint by a combination of hydraulic and air pressures. Air-assisted airless spray shall be performed in accordance with all provisions of Sections 7.3 and 7.4.

7.8 HOT AIR SPRAY APPLICATION: Hot air spray application shall be in accordance with the provisions of Sections 7.4 and 7.5.

7.9 HOT AIRLESS SPRAY APPLICATION: Hot airless spray application shall be in accordance with Sections 7.4 and 7.6.

7.10 PLURAL COMPONENT SPRAY APPLICATION

7.10.1 Plural component spray shall be in accordance with all the provisions of Section 7.4 and use either fixed or variable ratio systems depending upon the ratio of components.

7.10.2 Plural component spray is used primarily for thick-film applications of fast-setting coatings.

7.11 HIGH-VOLUME LOW-PRESSURE SPRAY

7.11.1 High-volume low-pressure spray shall be in accordance with all the provisions of Section 7.4.

7.11.2 High-volume low-pressure spray has a high transfer efficiency and can be used where other equipment with lower transfer efficiency is not permitted, as well as under less restrictive conditions.

8. Shop Coating

8.1 APPLICABILITY: All provisions of this specification shall be applicable to shop coating except those under Sections 9 and 10.

8.2 NUMBER OF COATS AND TYPE OF COATING: The number of coats, type of coating, and surfaces to be coated shall be specified in the procurement documents. If coating thickness is not specified, the guidance in Section 6.8.1 shall be followed. The coating application shall be scheduled to provide protection to the substrate at all construction stages. (See Note 16.7.)

8.3 DAMAGE TO SHOP COATING: Damage resulting from fabrication, handling and storage in the shop shall be repaired before leaving the shop. If the shop coating is damaged in shipping, unloading or field handling or fabrication, it shall be repaired before the field coating operations are begun.

8.4 CONTACT SURFACES: Contact surfaces shall be coated or left uncoated as specified in the procurement documents. When coated, the specification may require that at least the first coat shall be applied in the shop or the field, with subsequent coats being applied in the field while the surfaces are still accessible, unless otherwise specified (see Section 6.12).

8.5 REQUIREMENTS FOR WELDING

8.5.1 If the coating specified is harmful to the welders (usually the case) or is detrimental to the welding operation or the finished welds, the steel shall not be coated within four inches (100 millimeters) of the areas to be welded, except when using inorganic zinc-rich primer, which may be applied to within one inch (25 millimeters) of the weld area.

8.5.2 Shop welds and areas within four inches of such welds shall be cleaned in the shop using surface preparation methods at least as effective as those specified for the structure itself. All welds shall either be blast cleaned, thoroughly power tool cleaned, chemically scrubbed, or water scrubbed of all detrimental welding deposits.

8.6 RUST PREVENTIVE COMPOUNDS: Machine finished or similar surfaces that should not be coated, but do require protection, shall be protected as specified.

8.7 ERECTION MARKS: Erection and weight marks shall be placed on areas that have been previously shop primed unless otherwise specified. Compatible and non-bleeding markers or coating sticks shall be used.

9. Field Coating

9.1 APPLICABILITY: All provisions of this specification shall pertain to the field coating of steel structures except for inapplicable provisions of Sections 8 and 10.

9.2 SURFACE PREPARATION: Previously applied shop coatings must be dry or cured sufficiently for overcoating and be free of dirt, oil, chlorides, or other contaminants. The manufacturer's instructions shall be followed if special surface preparation procedures are required before application of the field coats. Damaged areas of shop applied coatings are to be touched-up in compliance with the requirements of Section 9.3. See SSPC-TU 4 for additional information on detection of soluble salts on steel surfaces.

9.3 TOUCH-UP OF SHOP COATED SURFACES: Steel that has been shop coated shall be touched up with the same coating as the shop coat unless otherwise specified. This touch-up shall include preparing, cleaning and coating of field connections, welds or rivets, and all damaged or defective coating and rusted areas as specified.

9.4 FIELD COATING PROCEDURES

9.4.1 Shop coated steel members shall preferably be field coated after erection of such members is completed. Steel members may be shop or field coated on the ground before erection, provided any damaged coating is touched-up with the same number of coats and kinds of coatings after erection. Whenever possible, the last full (finish) coat of coating shall be applied after erection of the structure and repair of damaged areas of existing coating.

9.4.2 The first field coat shall be applied to shop-coated steel in a timely manner, as required by the specification, to protect the steel from corrosion.

9.4.3 In the unlikely case that the types of field coatings are not specified, they shall be determined to be compatible with the shop coating and the service environment.

9.4.4 Contact surfaces shall be cleaned and coated as specified, unless otherwise stated in the procurement documents (see Section 6.12).

9.4.5 When specified, surfaces (other than contact surfaces) of fabricated assemblies that are accessible before erection but which will not be accessible after erection shall receive the entire specified coating system before erection.

9.4.6 Coating shall be applied to all cracks and crevices as required by the specification.

9.4.7 The final coat of coating shall not be applied until all concrete work is finished. In addition to the cleaning specified in Section 5.2, all cement or concrete spatter and drippings shall be removed before any application of coating. If any coating is damaged, the damaged surface shall be cleaned and recoated before the final coat is applied.

9.4.8 Wet coating shall be protected against damage from dust or other detrimental foreign matter as much as is practical.

9.4.9 Steel stored pending erection shall be kept free from contact with the ground and so positioned as to minimize water-holding pockets, soiling, contamination, and deterioration of the coating film. Such steel shall be cleaned and recoated or touched-up with the specified coating whenever it becomes necessary to maintain the integrity of the film.

9.4.10 All field welds and all areas within four inches of welds shall be cleaned before painting, using surface preparation methods at least as effective as those specified for the structure itself. All welds shall either be blast cleaned, thoroughly power tool cleaned, chemically scrubbed, or water scrubbed of all detrimental welding deposits.

10. Repair of Damaged Intact Coatings

10.1 APPLICABILITY: All provisions of this specification shall pertain to maintenance coating except the inapplicable portions of Sections 8 and 9.

10.2 SURFACE PREPARATION FOR RECOATING

10.2.1 Only loose, cracked, brittle, or non-adherent coating shall be removed in cleaning unless it is otherwise specified. Cleaning shall be performed two inches (50 micrometers) beyond the damaged areas in all directions or until tightly adhered coating is obtained. Where the remaining coating is thick, all exposed edges shall be feathered. Rust spots shall be thoroughly cleaned and the edges of all old coating shall be scraped back to sound material (see Note 16.9).

10.2.2 The contractor shall have the option to remove all coating from large areas containing smaller areas of coating which are required to be removed by the contract specification.

10.3 INCOMPATIBILITY: Only coatings compatible with the existing coatings and the service environment shall be used. All defects arising from unexpected incompatibility shall be corrected as specified.

10.4 WORK TO BE PERFORMED: The amount of cleaning and coating should be described in the procurement documents covering the work. It is important that the procurement documents cover precisely the work to be performed to avoid misunderstandings. In the absence of such specific provisions, the guidelines given in Note 16.9 may be used.

11. Application Procedures for Generic Groups of Coatings

11.1 GENERAL: The materials covered herein are to be applied as specified. In case of conflict with any other portion of this specification, these special provisions shall

govern. Minimum and maximum dry film thicknesses are indicated, but thicker coatings should be applied when recommended by the manufacturer's instructions. Materials which are not specifically covered in this specification shall be applied in accordance with the directions of the manufacturer.

11.2 DRYING OIL CURING COATINGS: Coatings that cure by air oxidation of drying oils (e.g., alkyds, unmodified drying oils, epoxy esters, etc.) shall be applied in accordance with the preceding provisions of this specification.

11.3 VINYLS AND CHLORINATED RUBBER COATINGS: Where permitted by local regulations, vinyl and chlorinated rubber finish coatings shall be applied by spray, with application by brush limited to small areas and touch-up. Primers may be brushed or sprayed. These coatings shall be thinned as recommended by the manufacturer. They shall be applied at a coverage that will result in the dry film thickness specified or, if not specified, the dry film thickness recommended by the manufacturer. When vinyl or chlorinated rubber coatings are applied by brush, coatings shall be applied to the surface with a minimum of brushing so that there is little or no lifting or softening of the undercoats.

11.4 BITUMINOUS COATINGS

11.4.1 Bituminous coating (thin film): The term bituminous coating (thin film) refers to low consistency solutions of coal tar or asphalt without filler or with only a slight amount of filler. They shall be applied in the same manner as conventional coatings and shall be applied at a coverage that will result in the dry film thickness specified. The expected range of dry film thickness for these thin film bituminous coatings is from 1.7 to 3.0 mils (40 to 75 micrometers). Unless otherwise specified, the necessary number of coats shall be applied to provide a total minimum dry film thickness of 5 mils (125 micrometers).

11.4.2 Cold-applied bituminous coating (medium film): The term cold-applied bituminous coating (medium film) refers to high consistency filled solutions of coal tar or asphalt. They shall be applied by brushing or spraying. If spray applied, special heavy-duty pump type spray equipment shall be used. This material should be stirred without thinning until it attains proper consistency for application. It shall be applied at a coverage that will result in the dry film thickness specified or, if not specified, the dry film thickness as recommended by the manufacturer. The expected range of dry film thickness for the cold-applied bituminous coating (medium film) is from 5 to 10 mils (125 to 250 micrometers) per coat and unless otherwise specified, the necessary number of coats shall be applied to provide a minimum dry film thickness of 12 mils (300 micrometers).

11.4.3 Cold-applied bituminous coating (thick film): The term cold-applied bituminous coating (thick film) refers to very high consistency filled solutions of coal tar or asphalt. They shall be applied by brushing or spraying. If spray applied, special heavy-duty pump type spray equipment shall be used. These materials must be stirred without thinning until they attain the proper consistency for application. They shall be applied at a coverage that will result in the dry film thickness specified or, if not specified, the dry film thickness as recommended by the manufacturer. The expected range of dry film thickness for the cold-applied bituminous coating (thick film) is from 15 to 18 mils (380 to 460 micrometers) per coat and unless otherwise specified the necessary number of coats shall be applied to provide a minimum dry film thickness of 25 mils (635 micrometers).

11.4.4 Cold-applied bituminous mastic (extra-thick film): The term cold-applied bituminous mastic (extra-thick film) refers to very thickly applied filled solutions of coal tar or asphalt applied by brushing, troweling, or spraying. If spray applied, special heavy-duty pump type spray equipment shall be used. Thinning should not be necessary and shall not take the place of adequate stirring. They shall be applied at a coverage that will result in the dry film thickness specified or, if not specified, the dry film thickness as recommended by the manufacturer. The expected range of dry film thickness for the cold-applied bituminous mastic (extra-thick film) is about 35 to 65 mils (890-1650 micrometers) per coat and it is preferable that it be applied in two coats. For additional information, refer to Paints 12, 32, and 33. A minimum total dry film thickness of 70 mils (1780 micrometers) is suggested.

11.4.5 Bituminous emulsion: The term "bituminous emulsion" refers to high consistency filled emulsions of coal tar or asphalt and water. Since they are compounded with water they must not be permitted to freeze at any time before drying. These emulsions shall be applied by brushing, spraying, or troweling. If spray applied, special heavy-duty pump type spray equipment shall be used. Thinning should not be necessary and shall not take the place of adequate stirring. They shall be applied at a coverage that will result in the dry film thickness specified or, if not specified, the dry film thickness as recommended by the manufacturer. The expected range of dry film thickness for the bituminous emulsion is from 8 to 15 mils (200 to 380 micrometers) per coat and unless otherwise specified the necessary number of coats shall be applied to provide a minimum dry film thickness of 20 mils (500 micrometers).

11.4.6 Coal tar primer and enamel: Coal tar primer and enamel for the interior and exterior of steel pipe, tanks and hydraulic structures shall be applied in accordance with the requirements of American Water Works Association (AWWA) specification C-203 unless otherwise specified. This specification is not intended to cover application of coal tar primers and enamel to steel structures of oil and gas pipelines when a low penetration enamel is considered desirable. Such application shall be done in accordance with specifications of the purchaser.

11.5 EPOXY AND COAL TAR EPOXY COATINGS: Two-package chemically cured epoxy and coal tar epoxy

coatings shall be stored, mixed, thinned, applied, and cured in accordance with the manufacturer's instructions and with the provisions of Sections 5.4.11 and 6. Also, any special precautions and instructions by the manufacturer shall be followed. Chemically cured coatings shall not be applied when the surface, coating, or air temperature is below the manufacturer's published minimum recommendation. When coatings formulated for low temperature application are applied at temperatures below 40 °F (4° C), it shall be verified that the surface is free of moisture (unless formulation permits it) and ice at the time of application.

11.6 ZINC-RICH COATINGS: For additional information refer also to SSPC Paint 20, "Zinc-Rich Primers" and PS Guide 12.00, "Guide to Zinc-Rich Coating Systems."

11.6.1 Inorganic zinc-rich: Inorganic zinc-rich coatings shall be applied by spray. Application by brush shall be limited to small areas and touch-up work. If the zinc powder is packaged separately, mix with the vehicle just before use. Inorganic zincs shall be thinned as recommended by the manufacturer. The coatings shall be applied to a dry film thickness between 2 to 4 mils (50 and 100 micrometers), unless otherwise stated in the specification or manu-facturer's written instructions. When applying by spray, the zinc dust shall be kept in suspension by use of a mechanical agitator for both airless and air atomized (conventional) spray. The vessel containing the coating and the spray gun shall be kept at approximately the same elevation (e.g., within 3 feet [1 meter]) while spraying. Prior to topcoating, a barrier or tie coat may be required for overcoating with certain generic coatings. The manufacturer's recommendations shall be followed. Sufficient curing of the zinc-rich primer is necessary before topcoating. The coating manufacturer may require a minimum relative humidity to ensure curing. Dry spray of the zinc-rich primer will result in improper adhesion of the topcoat. Dry spray shall be removed with a stiff bristle brush or wire screen without polishing the surface of the coating.

11.6.2 Organic zinc-rich: Most of the provisions of Section 11.6.1 are also applicable for the application of organic zinc-rich coatings except that they may also be applied by brush or roller when permitted by the manufacturer's written recommendations.

11.7 URETHANE COATINGS: For additional information, refer also to PS Guide 17.00, "Guide for Selecting Urethane Coating Systems."

11.7.1 Single component moisture cured urethane coatings which meet ASTM D 16, Type II may be applied by brush, roller, conventional spray, and airless spray. Special care shall be taken to ensure that all spray equipment is moisture free. Since these coatings cure by reaction with moisture in the air, it should be noted that application on days when the humidity is low will result in slow cure. The manufacturer's directions shall be followed concerning thinning and application parameters. Type II urethane coatings shall be mixed by a mechanical mixer prior to application. This shall be done slowly so as not to create a vortex and introduce moisture into the coating which could reduce the pot life.

11.7.2 Two component polyisocyanate polyol-cured urethane coatings may be applied by brush, roller, conventional spray, airless spray, or plural-component spray. Special care shall be taken to insure that all spray equipment is moisture free. The manufacturer's directions shall be followed concerning thinning and application parameters. The two components (isocyanate and polyol) shall be mixed as specified by the manufacturer. Mixing shall be done slowly so as not to create a vortex and introduce moisture into the coating which could reduce the pot life. These urethane coatings are extremely susceptible to moisture contamination and shall not be applied unless temperatures, both during application and up to three hours after application, will be at least 5 F° (3 C°) above the dew point.

11.8 WATERBORNE THERMOPLASTIC COATINGS

11.8.1 Waterborne thermoplastic coatings (commonly called "latex coatings") may be applied by spray, brush, or roller. Cross brushing or cross spraying application is highly desirable. Application by spray tends to provide the best leveling. Conventional or airless spray can be used with most latex coatings. Since one-coat systems have very limited protective properties, multiple-coat systems shall always be applied. On structural steel, the preferred system is two coats of primer and one or more topcoats to achieve the specified dry film thickness. Where the dry film thickness is not specified, apply each coat at a minimum dry film thickness of 2.5 mils (64 micrometers) to achieve a total dry film thickness of 7.5 mils (190 micrometers). For additional information, refer to SSPC Paints 23 and 24.

11.8.2 The atmospheric conditions at the time the latex coating, especially the primer, is applied are extremely important. A latex primer shall not be applied at a temperature below 50 °F (10 °C) or above 120 °F (50 °C) or when curing (coalescence) is expected outside this range. It should be noted that some waterborne thermoplastic coatings are formulated for application at temperatures below 50 °F (10 °C). High humidities (e.g., 80%) will slow the drying of these coatings (see Sections 6.2 and 6.3).

11.8.3 The best conditions for storage of latex coatings are at temperatures between 40 °F (4 °C), and 80 °F (27 °C).

12. Curing and Handling of Coatings

12.1 DRYING OF COATINGS

12.1.1 The minimum and maximum curing times before overcoating an existing coat of coating shall conform to the primer and overcoat manufacturer's written recoat instructions. If the maximum time is exceeded, the cured coating

shall be roughened or otherwise treated as recommended by the manufacturer of the overcoat before applying another coat.

12.1.2 No coating shall be force dried under conditions which will cause checking, wrinkling, blistering, formation of pores, or detrimentally affect the protective properties of the coating. Always check with the coating manufacturer before force drying a coating.

12.1.3 Coating shall be protected from rain, condensation, contamination, snow, and freezing until sufficiently cured for exterior exposure.

12.1.4 No coating shall be subjected to immersion before it is thoroughly dried or cured in accordance with the manufacturer's written instructions.

12.2 HANDLING OF COATED STEEL

12.2.1 Coated steel shall not be handled, loaded for shipment, or shipped until the coating has dried except as necessary in turning for coating or stacking for drying.

12.2.2 Coating which is damaged in handling shall be removed and touched up with the same number of coats and kinds of coatings as were previously applied to the steel or as specified by the procurement documents.

13. Inspection

13.1 All work and materials supplied under this specification shall be subject to timely inspection as required by the specification. The contractor shall correct such work or replace such material as is found deficient under the specification. In case of dispute, the arbitration or settlement procedure established in the procurement documents, if any, shall be followed. If no arbitration or settlement procedure is established, the procedure specified by the American Arbitration Association is recommended.

13.2 Samples of coatings used under this specification shall be supplied upon request along with the supplier's name and identification for the materials.

13.3 The procurement documents covering work or purchase should establish the responsibility for samples, testing and any required affidavit certifying full compliance with the specification.

14. Safety and Environmental Concerns

14.1 All safety and environmental requirements stated in this specification and its component parts apply in addition to any applicable federal, state, and local rules and requirements. They also shall be in accord with instructions of the coating manufacturer and requirements of insurance underwriters.

14.2 Coatings may be hazardous because of their flammability or toxicity. Proper safety precautions shall be observed to protect against these recognized hazards. Safe handling practices are required and should include, but not be limited to, the provisions of PA Guide 3, "A Guide to Safety in Coating Application."

14.3 Some coatings specified herein may not comply with some air quality regulations because of their organic solvent content.

14.4 MATERIAL SAFETY DATA SHEETS (MSDSs): Information pertaining to the safe handling, application, and disposal of coatings can be obtained from their MSDSs, which are supplied by the manufacturers. The MSDSs for all materials shall accompany them wherever they are stored or used.

15. Disclaimer

While every precaution is taken to ensure that all information furnished in SSPC specifications is as accurate, complete, and useful as possible, SSPC cannot assume responsibility nor incur any obligation resulting from the use of any materials, coatings, or methods specified therein, or of the specification itself.

16. Notes

Notes are not requirements of this specification.

16.1 It is recommended that coating be stored in a warm building during very cold weather so that it is not necessary to thin the coating excessively for application since excessive thinning will result in a low solids content, and the dry film thickness will be below that intended for the particular material. It is advantageous to the contractor that this material be kept warm or heated prior to use, inasmuch as less material will be required, application will be easier, and the resulting film will meet the intent of the specification. When warming coatings, their temperature should not be permitted to exceed 100 °F (38 °C) unless special coating heating equipment is used. When the coating (or thinner) has a flash point below 100 °F (38 °C) it should not be heated above its flash point if it is heated in an open container.

16.2 As much care as deemed practical should be exercised to prevent contamination of coated surfaces with particulate materials, soluble salts, and other foreign matter before overcoating. Thus, overcoating should be accomplished as soon as possible after curing requirements of undercoats are met. When intercoat contamination occurs before overcoating, the surface shall be washed with water and detergent or other approved material to remove as many contaminants as possible.

16.3 A number of instruments are available that measure temperature with great accuracy. Some are described in The Inspection of Coatings and Linings (SSPC 97-07). Also refer to Volume 1 of the SSPC Painting Manual.

16.4 Cold weather, high humidity, water, fog and mist, and rain during coating application, drying, or curing are detrimental to the performance of most coatings. It is

impossible to set down specific rules which govern the limits in which the coating application should be done since the variation from one coating to another may be large. Generally speaking, application should be done only under conditions which are conducive to quick evaporation of water. This generally means that the relative humidity should be low. Steel should not be coated when it is below the dew point since condensation of water on the steel will result. The only exception is for coatings to be applied that are formulated to tolerate moisture or liquid water on the surface.

Coatings which dry solely by evaporation of organic solvent are not believed to be harmed by application to steel which is below 32 °F (0 °C); however, under such conditions, the danger always exists that there will be a layer of ice on the surface of the steel. This same condition may prevail for application of conventional, air-oxidizing coatings. When the humidity is low and the steel is thoroughly dry beyond question, it is believed that coatings may be applied, provided the coating is of a type which will not be injured or whose drying will not be impaired by low temperature or low humidity.

Generally speaking, coatings should not be applied in weather which will subject them to damage, nor should they be applied when it is expected that the temperature will vary either below or above the temperature range recommended in writing by the manufacturer or drop to freezing before they have cured.

The dew point (see Section 6.2) is the temperature below which moisture from the air will begin to condense. If the surface temperature of the substrate is at or below the dew point, moisture will condense on it. It may be determined with a sling psychrometer, or other instrument, usually requiring determination of wet and dry bulb temperatures (ASTM E 337, "Relative Humidity by Wet- and Dry-Bulb Psychrometer"). Hand-held, digital moisture meters, hygrometers, etc., can make measurement of relative humidity and dew point simple and instantaneous. These electronic instruments can also provide simple measurement of relative humidity and dew point of a surface that is at a different temperature than ambient conditions.

In practice, the dew point requirement can be presumed to be satisfied if a thin, clearly defined film of water applied to the cleaned surface with a damp cloth evaporates within 15 minutes.

Low temperatures greatly reduce the curing rates of chemically cured coatings (certain epoxies, urethanes, inorganic zinc-rich coatings, coal tar epoxies, etc.). Unless otherwise permitted, chemically cured coatings should not be applied when the surface, coating, or ambient temperature is outside the range recommended by the coating manufacturer's written instructions.

16.5 Coatings on structural steel are generally applied by brush or by spray. Either method is satisfactory if properly performed and the coating is formulated for the application method being used. The variations are slight, and often overshadowed by variations in workmanship.

Brushing of primers has the advantage of working coating into cracks and crevices and other surface irregularities. It may create brush marks, however, with coatings having limited leveling. Lacquer type coatings, such as vinyls, may be applied by brush with considerable difficulty only; the priming coat brushes on with least difficulty and results in better adhesion to the surface than spraying. Finish coats of lacquer type coating tend to lift underlying coats by solvent action and brushing combined; for this reason such finish coatings are best applied by spraying.

With many types of coatings, properly used high pressure spray methods can result in a thicker, more impermeable film. Spray operators must be properly selected and trained. Careful supervision and inspection are necessary with the various spray application methods to insure against such difficulties as dirty surfaces, dry spray, pinholes, holidays, missed areas, blind spots, contamination of coating or air, wind loss, or excessive outdoor overspray.

Several advantages are possible with the various high pressure airless methods of coating application, both hot and cold spray. These include labor savings as a result of fast application and a greater thickness per coat. Additional savings also can be traced to less flowback, less overspray, power (compressor) savings, use of higher solids in coating formulations, and less sensitivity to changes in ambient temperature during application.

16.6 With roller application of coating on structural steel, high production rates approaching that of conventional spraying may be possible. The method works best on large smooth areas such as tanks or walls. Difficulties may be encountered when coating welds, rough spots, pits, rivet heads, edges, corners, etc., to ensure that adequate coating is applied. Supplementary brush coating is mandatory for those areas on structural steel, even though special rollers for these areas are available for general work. The requirements are generally the same as for brush and spray coating. Excellent results have been achieved, and it is possible to build up specified film thicknesses by this method. Roller coating is particularly useful where spraying cannot be undertaken due to the hazards from overspray or the flammability of solvent.

16.7 Selection for the type of shop primer to be used should take into consideration the length of time anticipated between the shop applied coat and the first coat applied in the field. The period before a shop coat is to be topcoated in the field can vary from the construction schedule. Long periods of field exposure may degrade the shop coating so that it may have to receive periodic maintenance to continue to protect the steel from corrosion and be in a suitable condition for overcoating.

When longer periods of exposure are anticipated, special consideration should be given to surface preparation,

coating selection, film thickness, and to early application of a second primer/overcoat. Between shop priming and field coating, structural steel is often exposed to the most severe environments it will ever encounter and at a time when it is protected by only one coat of primer. The prime coat of coating is usually formulated to provide short-term protection and a good bond between the steel substrate and subsequent coats. Many shop-applied primers are not intended to provide long-term protection of the steel, particularly during exposure to dampness, bad weather, and industrial fumes.

16.8 For high-performance coating service, special weld surfacing may be required to provide suitable surface conditions for the coating system specified. NACE RP0178 provides one method of specifying weld surfacing requirements, as well as other design and fabrication requirements for improving coating serviceability. Other methods of specifying and accepting weld surfacing conditions are employed in various industries. The weld surfacing requirements should generally be placed in the project specifications so that the painting contractor will not have to perform welding or grinding to provide the specified final surface conditions.

16.9 In maintenance coating it is not ordinarily intended that sound, adherent, old coating be removed unless it is excessively thick or brittle or is incompatible with the new coating. It is essential, however, that the removal of deteriorated coating be carried back around the edges of the spot or area until an area of completely intact and adherent coating film, with no rust or blisters underneath, is attained. Edges of tightly adherent coating remaining around the area to be recoated must be feathered so that the recoated surface can have a smooth appearance to provide a transition from the area of repair to the intact coating. The remaining old coating should have sufficient adhesion so that it cannot be lifted as a layer by inserting the blade of a dull putty knife under it using moderate pressure.

Unless experience or spot tests have shown otherwise, it is usually preferable to use the same generic type of coating in recoating as in the original coating. If the new coating curls or lifts after application to an existing coating, the cleaning and application procedures should be reviewed to determine if good coating practices have been followed. If the new coating is found to be incompatible with the previous coating system, either the primer should be replaced with one more compatible, or the old coating should be completely removed before application of a new system.

Coating records should be kept by the owner for the purpose of determining information on the durability of coatings and the economic protection afforded by them. Refer to Volume 1 of the SSPC Painting Manual for additional information and a suggested record form.

APPENDIX A - ADDITIONAL REFERENCE MATERIALS

The standards, reports, and publications listed below are not required as part of the specification but are recommended resources (note that the standards listed in Section 3 are required parts of this specification).

SSPC PUBLICATIONS AND STANDARDS:

AB 1	Mineral and Slag Abrasives
AB 2	Cleanliness of Recycled Ferrous Metallic Abrasives
AB 3	Newly Manufactured or Re-Manufactured Steel Abrasives
PA 1	Shop, Field, and Maintenance Painting of Steel
PA Guide 4	Guide to Maintenance Recoating with Oil Base or Alkyd Coating Systems
PA Guide 5	Guide to Maintenance Coating Programs
Guide 6	Guide for Containing Debris Generated During Paint Removal Operations
Guide 7	Guide for the Disposal of Lead-Contaminated Surface Preparation Debris
Guide 8	Guide to Topcoating Zinc-Rich Primers
Guide 11	Guide for Coating Concrete
Guide 12	Guide of the Illumination of Industrial Painting Products
ME 1	Test Panel Preparation Method No. 1, Uncontaminated Rusted Steel
Paint 15	Steel Joist Shop Primer
Paint 20	Zinc Rich Primers (Type I - "Inorganic" and Type II - "Organic")
Paint 23	Latex Primer for Steel Surfaces
Paint 24	Latex Semi-Gloss Exterior Topcoat
Paint 25	Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel
Paint 25 BCS	Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Blast Cleaned Steel
Paint 32	Coal Tar Emulsion Coating
Paint 33	Coal Tar Mastic - Cold-Applied
Paint 34	Water-Borne Epoxy Topcoat for Steel Structures
Paint 35	Medium Oil Alkyd Primer (Air Dry/ Low Bake)
PS Guide 17.00	Guide for Selecting Urethane Painting Systems

PS Guide 12.00	Guide to Zinc-Rich Coating Systems
QP 1	Standard Procedure for Evaluating Painting Contractors (Field Application to Complex Industrial Structures)
QP 3	Standard Procedure for Evaluating Qualifications of Shop Painting Contractors
SP 2	Hand Tool Cleaning
SP 3	Power Tool Cleaning
SP 5/NACE No. 1	White Metal Blast Cleaning
SP 6/NACE No. 3	Commercial Blast Cleaning
SP 7/NACE No. 4	Brush-Off Blast Cleaning
SP 10/NACE No. 2	Near-White Blast Cleaning
SP 11	Power Tool Cleaning to Bare Metal
SP 12/NACE No. 5	Surface Preparation and Cleaning of Steel and Other Hard Materials by High- and Ultrahigh-Pressure Water Jetting Prior to Recoating
SP 13/NACE No. 6	Surface Preparation of Concrete
SP 14/NACE No. 8	Industrial Blast Cleaning
TR 2/NACE 6G198	Joint Technical Report, Wet Abrasive Blast Cleaning
TU 1	Surface-Tolerant Coatings for Steel
TU 2	Design, Installation, and Maintenance of Coating Systems for Concrete Used in Secondary Containment Facilities
TU 3	Technology Update on Overcoating
TU 4	Field Methods for Retrieval and Analysis of Soluble Salts on Substrates
VIS 1-89	Visual Standard for the Inspection of Blast Cleaned Steel
VIS 3	Visual Standard for Power and Hand-Tool Cleaned Steel
VIS 4(I) /NACE No. 7	Visual Reference Photographs for Steel Cleaned by High Pressure Water Jetting
SSPC 97-07	The Inspection of Coatings and Linings

ASTM STANDARD:

E 337	Test Method for Measuring Humidity with a Psychrometer (The Measurement of Wet- and Dry-Bulb Temperatures)

AMERICAN WATER WORKS ASSOCIATION (AWWA) STANDARD:

C 203	Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied